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PROMOTER SEQUENCES PROVIDING MALE TISSUE-PREFERRED EXPRESSION IN PLANTS

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This application claims priority to previously filed and co-pending provisional application USSN 60/267,527, filed February 8, 2001.

BACKGROUND OF THE INVENTION

Development of hybrid plant breeding has made possible considerable advances in quality and quantity of crops produced. Increased yield and combination of desirable characteristics, such as resistance to disease and insects, heat and drought tolerance, along with variations in plant composition are all possible because of hybridization procedures. These procedures frequently rely heavily on providing for a male parent contributing pollen to a female parent to produce the resulting hybrid.

Field crops are bred through techniques that take advantage of the plant's method of pollination. A plant is self-pollinating if pollen from one flower is transferred to the same or another flower of the same plant. A plant is cross-pollinated if the pollen comes from a flower on a different plant.

In *Brassica*, the plant is normally self sterile and can only be cross-pollinated. In self-pollinating species, such as soybeans and cotton, the male and female plants are anatomically juxtaposed. During natural pollination, the male reproductive organs of a given flower pollinate the female reproductive organs of the same flower.

Maize plants (*Zea mays L.*) present a unique situation in that they can be bred by both self-pollination and cross-pollination techniques. Maize has male flowers, located on the tassel, and female flowers, located on the ear, on the same plant. It can self or cross pollinate. Natural pollination occurs in maize when wind blows pollen from the tassels to the silks that protrude from the tops of the incipient ears.

A reliable method of controlling fertility in plants would offer the opportunity for improved plant breeding. This is especially true for development of maize hybrids, which

A further object of the invention is to provide a method of using such DNA molecules to mediate male fertility in plants.

Further objects of the invention will become apparent in the description and claims that follow.

SUMMARY OF THE INVENTION

This invention relates to nucleic acid sequences, and, specifically, DNA molecules and the amino acid encoded by the DNA molecules, which are critical to male fertility. A promoter of the DNA is identified, as well as its essential sequences. It also relates to use of such DNA molecules to mediate fertility in plants.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1. is a locus map of the male sterility gene BS92-7.

FIG. 2. is a gel of a Southern Blot analysis of *EcoRI* digested DNA from a Mu family segregating for male sterility and hybridized with a Mu1 probe.

FIG. 3. is a Northern Blot analysis gel of total RNA from various tissues hybridized with a *PstI/BglII* fragment from the BS92-7 clone.

FIG 4 shows the nucleotide and protein sequences of the cDNA of BS92-7 (The cDNA is SEQ ID NO: 1, the protein is SEQ ID NO: 2).

FIG. 5 is the genomic BS92-7 sequence (the nucleotide sequence is also referred to as SEQ ID NO: 3 .

FIG 6 is comparisons of the genomic BS92-7sequence with the cDNA (SEQ ID NO:3 and SEQ ID NO:1); Part 1 is bases 301 to 450 of SEQ ID NO: 3 and bases 1 to 117 of SEQ ID NO: 1. Part 2 is bases 501 to 750 of SEQ ID NO: 3 and bases 118 to 290 of SEQ ID NO: 1. Part 3 is bases 851 to 1050 of SEQ ID NO: 3 and bases 291 to 487 of SEQ ID NO: 1. Part 4 is bases 1151 to 1350 of SEQ ID NO: 3 and bases 488 to 648 of SEQ ID NO: 1. Part 5 is bases 1401 to 1650 of SEQ ID NO: 3 and bases 649 to 841 of SEQ ID NO: 1. Part 6 is bases 1701 to 2140 of SEQ ID NO: 3 and bases 842 to 1197 of SEQ ID NO: 1.

FIG. 7. is a Northern analysis gel showing developmental gene expression in microsporogenesis of the gene BS92-7.